

## Anson, Robie

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**From:** Minahan, Kristi L - DNR <Kristi.Minahan@wisconsin.gov>  
**Sent:** Friday, July 21, 2017 3:19 PM  
**To:** Michael Paul; Hammer, Edward; Anson, Robie  
**Cc:** Diebel, Matthew W - DNR; LaLiberte, Gina - DNR; Beranek, Ashley E - DNR; Shupryt, Michael P - DNR  
**Subject:** Algal indicators paper  
**Attachments:** WI algal stream metrics-DRAFT TSD Excerpt\_7-21-2017.docx; Wisconsin Phos WQS Criteria Tech Support 12-9-2010.pdf

Hello Michael—Are you the Michael Paul who went to UGA? I think we chatted a couple years ago at an Ecology reunion. I just read your paper on algal indicators in streams that EPA sent out. This looks like a great resource & I'm very appreciative of your work in putting together this comprehensive review; it will be useful for us to reference. I wanted to let you know about our uses of algal indicators here in Wisconsin, in case you hadn't come across them in your research.

- When WI promulgated our phosphorus criteria in 2010 for streams, WDNR used three indices to evaluate diatom community responses to phosphorus: the Diatom Nutrient Index (DNI), the Diatom Siltation Index (DSI), and the Diatom Biotic Index (DBI). These three indices were used along with various fish, bug, & water chemistry metrics to derive the TP criterion. I've attached the P criterion Technical Support Document—see p. 16 & 17. It's largely based on work done in: Robertson, D. M., D. J. Graczyk, P. J. Garrison, L. Wang, G. LaLiberte, and R. Bannerman. 2006. Nutrient concentrations and their relations to the biotic integrity of Wadeable streams in Wisconsin. U.S. Geological Survey Professional Paper 1722, Middleton, WI.
- We're currently in the rulemaking process to develop "phosphorus response criteria" (a.k.a. "combined nutrient criteria"), to be used in conjunction with the TP criteria from 2010. I've attached a short excerpt from our draft Technical Support Document. We're proposing the following for streams:
  - Using a viewing bucket method to estimate benthic algal biomass. This would be used to (a) assess support of our recreation use, and (b) as a screening tool to determine if phosphorus concentrations are affecting aquatic life use. If the result of the viewing bucket screening is inconclusive for the purposes of (b), we move to the next step...
  - Assessing benthic diatom taxa using our "diatom phosphorus index" (DPI). The DPI was developed separately from the three tools mentioned above, to zero in on response to P concentrations. The DPI at a site is estimated as the weighted average of the TP optima of the species present at that site, to infer ambient phosphorus concentrations. If a site has a measured TP median that is above our statewide TP criterion, but its DPI is estimated at below the criterion, then we would not list that site as impaired.
- We're not currently planning to use diatoms or algal biomass as a stand-alone biocriteria for streams.

I'm attaching a excerpt from our draft Technical Support Document for the proposed rules. Let us know if you have any questions!

Kristi Minahan

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**Kristi Minahan**

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